April 19, 2005 Matls. IM 318
Supersedes October 19, 2004

AIR CONTENT OF FRESHLY MIXED CONCRETE BY PRESSURE

SCOPE

This test method describes the procedure for determining the air content of freshly mixed concrete by one form of pressure method.

PROCEDURE

NOTE: Certain coarse aggregates in east central Iowa will cause air meter readings to indicate higher air content than is actually in the concrete. An aggregate correction factor must be applied to correct the air content. The District Materials Engineer will supply the correction factor when using these aggregates. AASHTO T152 requires an aggregate correction factor for all concrete; however, it typically is not large enough for most aggregates to require adjustment.

A. Apparatus

1. All apparatus used shall incorporate the requirements of Section 2a, under Apparatus, of AASHTO Designation T-152. While there are several meters, which meet these requirements, the directions given below in B., Test Procedure, apply to the Washington-type presently in use by the Iowa Department of Transportation.

   NOTE: It is recommended that a calibration be performed prior to any new pour.

B. Test Procedure (For use with Washington-Type Air Meter)

1. Calibration of Apparatus (Water Method)

   a. To calibrate the apparatus, first fill the measuring bowl with water, then withdraw measured amounts of water corresponding to definite percentages of air in the base. After each increment of water is withdrawn, pump air into the head until a predetermined initial pressure line on the dial is reached.

   b. Open the operating valve and read the air content directly from the dial. The reading on the dial is compared to the known amount of air in the base and suitable corrections made. Consult air meter box lid for more explicit calibration instruction.

2. Calibration of Apparatus (Plug Method)

   a. To calibrate the apparatus, first fill the measuring bowl with water, and then insert the calibration plug. Place the head on the unit and pump air into the head until a predetermined initial pressure line on the dial is reached.

b. Using a rubber syringe, inject water through one petcock until all the air is expelled through the opposite petcock. Jar the base to insure removal of all air. Leave petcocks open.

c. Stabilize dial hand at proper initial pressure line by pumping or bleeding off, as needed, while lightly tapping the backside of the dial with the fingers. Inject water through the petcock again to make sure all the air is expelled.

d. Close both petcocks and press down on the thumb lever exhausting air into the base. The dial should read 5% air for each calibration plug in the measuring bowl with a maximum variation of ±0.2% air. Two plugs may also be used to get a 10% air reading. The gauge is set to 5.0% when calibrated in the Central Laboratory. If the reading is off by more than ±0.2% at either 5% or 10% setting, the gauge should be returned to the Central Laboratory for repair.

3. Operation of Apparatus (Determination of Air Content of Concrete)

a. Fill the base with a sample of fresh concrete placing the concrete in the base in three equal layers. Rod each layer twenty-five times with the tamping rod provided with the meter. For slumps less than 1 in. (25mm), the sample may need to be consolidated by internal vibration.

b. Do not allow the rod to forcibly strike the bottom of the base while rodding the bottom layer. The rod should just penetrate the underlying layer when rodding the upper layers. Care should also be taken to avoid hitting the top edge of the base with the tamping rod.

c. Tap the sides of the base 10-15 times with a rubber mallet after rodding each layer to close the holes left by the rod.

d. A clean, smooth surface on the top edge of the base is necessary to insure a tight seal with the cover. Strike off base, level full, with the straight edge furnished. Wipe the top edge of the base clean to insure a tight seal with the cover.

e. Clamp cover on with petcocks open.

f. With the built in pump, pump air into the air chamber atop the cover until the pressure indicator points to the proper initial pressure line on the gauge. **NOTE:** The pump stem may need a light coat of oil to slide freely. Too much oil on the stem will fill the pump chamber and block the air valve causing the pump to fail.

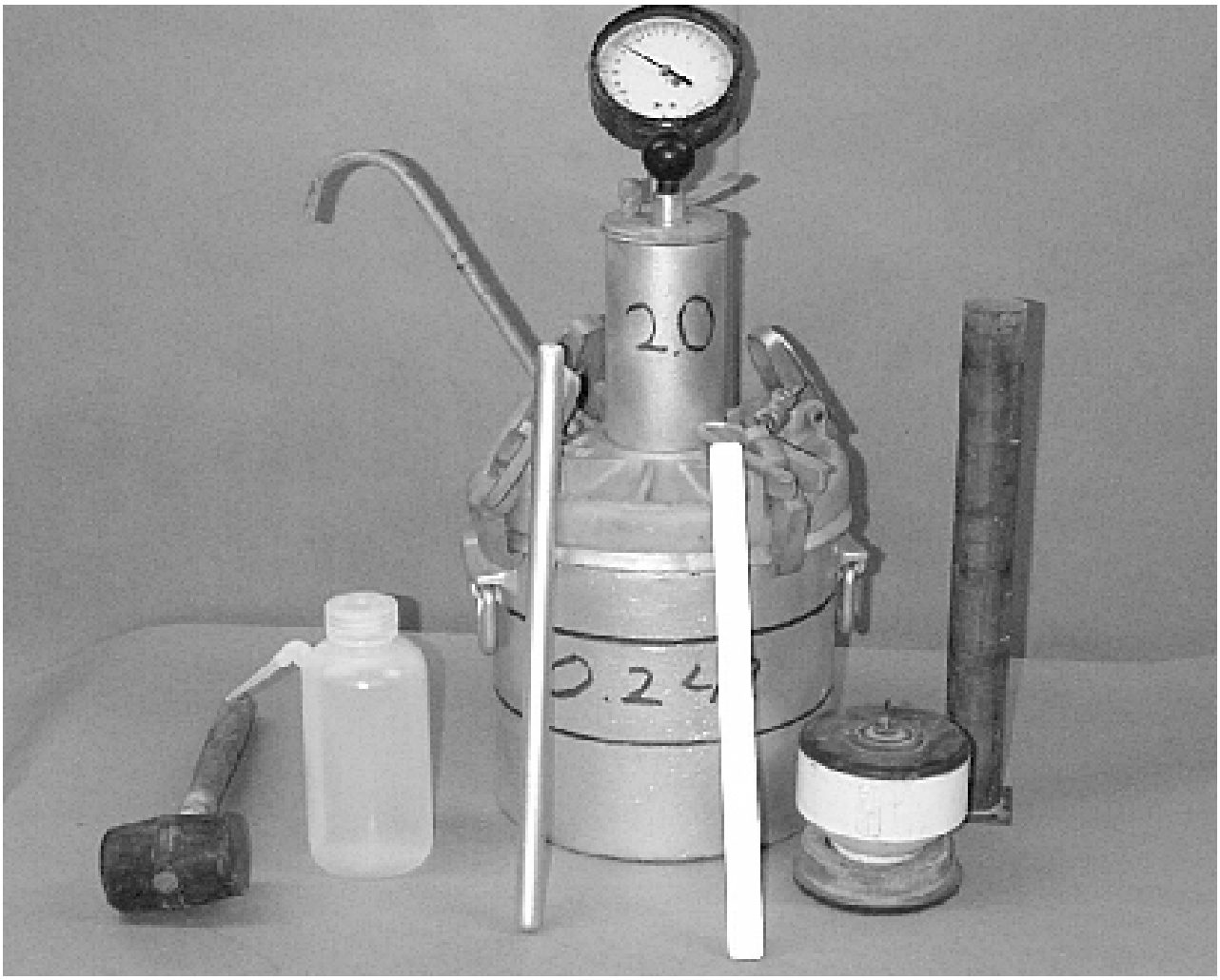
g. Using a rubber syringe, inject water through one petcock until all the air is expelled through the opposite petcock. Jar the base to insure removal of all air. Leave petcocks open.

The sequence of Steps f. and g. may be interchanged without adversely effecting the test result.

h. Stabilize dial hand at the proper initial pressure line by pumping or bleeding off, as needed, while lightly tapping the backside of the dial with the fingers. Inject water through the petcock again to make sure all the air is expelled.

i. Close both petcocks. Press down on lever to release air into the base. Hold lever down a few seconds lightly tapping the backside of the dial with your fingers until the dial stabilizes. Observe the dial reading before letting up on the lever. Record the dial reading.

j. Open petcocks to release pressure, and then remove cover. Empty the concrete from base, clean up base, cover with petcocks left opened.



Air Meter and Calibrating Accessories